REMARKS

In response to the final Office Action dated June 1, 2006, the Applicants hereby request reconsideration of the pending claims in light of the following.

STATUS OF CLAIMS

Claims 1-8 and 11-14 are pending.

Of these, claims 2-5, 7, 8, and 14 are amended.

CLAIM REJECTIONS

Claims 1-4, 7, 8, and 11 were rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Pat. No. 6,104,229 to Lien ("Lien"). Applicants respectfully traverse this rejection, it being submitted that Lien does not disclose each and every element and limitation of claims 1-4, 7, 8, and 11.

For a detailed summary of the present invention, the Examiner is directed to the Response to Office Action dated March 20, 2006. In regards to the rejection noted above however, it is reiterated that the present invention relates to a level shift circuit in combination with an active pull-up device for a bi-directional 1-wire communication bus. The 1-wire bus is used for digital communications between a transceiver and one or more communication devices connected to the bus. The active pull-up device is disposed on the 1-wire bus between the transceiver and the communication devices, and is connected between ground (0 volts) and the positive power supply +Vcc. The active pull-up device detects the voltage level on the 1-wire bus. When the voltage level goes above a threshold value, as determined by measuring the voltage potential between the bus and ground, the active pull-up device switches from an internal high-impedance load (e.g., in effect connected between the bus and +Vcc) to an internal low-impedance load. This reduces the RC time constant of the impedance and parasitic capacitance in combination, causing the voltage level on the bus to transition to the designated logic "1"/high level much more quickly than it otherwise would.

The level shift circuit is added to the active pull-up device to mitigate the effects of system noise. The level shift circuit, e.g., a diode, is connected between ground and the input terminal of the pull-up device that is normally connected to ground. The level shift circuit is configured to produce a constant output voltage, which is applied to the active pull-up device as a constant reference voltage. Thereby, instead of measuring voltage levels on the 1-wire bus with respect to ground, they are measured with respect to the constant voltage level of the level shift circuit. Further, the 1-wire bus communication system is configured to operate with the constant reference voltage as a bias. As such, according to one embodiment of the present invention, not only is the active pull-up device set to operate at a constant bias voltage (by adding the level shift circuit), but the entire communication system is as well, at least in regards to communication voltage signals across the 1-wire bus.

In combination with a level shift circuit, claim 1 recites "an active pull-up device coupled to a one-wire bus, wherein the active pull-up device is configured to decrease the transition time of a voltage signal on the one-wire bus transitioning from a first voltage level to a second, higher voltage level." In the Office Action, the Examiner contends that FIG. 6 of Lien discloses "an active pull-up device (501) coupled to a one-wire bus (inherent seen connected to Vout 212), wherein the active pull-up device (501) is configured to decrease the transition time of a voltage signal on the one-wire bus transitioning from a first voltage level to a second, higher voltage level." Having reviewed the Lien patent, the Applicants contend, on the contrary, that even if the circuit in FIG. 6 in Lien is properly characterized as an active pull-up device, it is not "configured to decrease the transition time of a voltage signal on the one-wire bus transitioning from a first voltage level to a second, higher voltage level."

To elaborate, the circuit in FIG. 6 in Lien is an input buffer for an integrated circuit. The point of such buffers generally is for impedance matching and/or input/output isolation. The specific purpose of the buffer in Lien is to reduce the voltage level across the gate oxide of a buffer input

transistor. See Lien, Col. 1, lines 56-58. The circuit in FIG. 6 of Lien does not act to decrease voltage signal transition times of a 1-wire bus. This is evidenced in the attached exhibits.

Exhibit A (enclosed) shows a schematic diagram of a simple RC circuit, which roughly corresponds to a 1-wire bus having parasitic capacitance. As a transitioning voltage signal V1 is applied to the line, from 0 to 5 volts, it takes a while for the line to fully rise to the 5-volt level, because of the capacitance C1. The voltage signal across capacitor C1 (generated via computer simulation using Multisim™ 9) is shown in Exhibit B. Note that it takes approximately 5 ms for the voltage level to rise to the maximum 5 volt level.

In regards to the circuit in FIG. 6 of Lien, no matter how the circuit is connected to the 1-wire bus 212, it does not decrease the transition time of a low-to-high transitioning voltage signal. Exhibit C shows the circuit of Lien FIG. 6 connected to a simulated 1-wire bus with parasitic capacitance C1. Exhibit D shows the voltage signal across the capacitor C1 as the voltage source V1 transitions from 0 to 5 volts. As indicated, it takes at least as long, e.g., 5 ms, for the bus voltage to increase to the maximum level. (Although the output voltage is indicated as 2.5 V in Exhibit D, it is noted that a different transistor Q2 would increase the output voltage to close to 5 volts, with a similar rise time.)

Besides that the circuit in FIG. 6 of Lien does not act as an active pull-up device for decreasing transition times of voltage signals on a 1-wire bus, there is no implied or explicit teaching in Lien of using the circuit in FIG. 6 in this manner. Instead, the circuit is used as an IC input buffer having a reduced voltage level across the gate oxide of the buffer input transistor, e.g., transistor 501. Additionally, none of the other circuits shown in Lien appear configured for use as an active pull-up device that decreases "the transition time of a voltage signal on the one-wire bus transitioning from a first voltage level to a second, higher voltage level." Accordingly, since Lien does not disclose this element as recited in claim 1, Lien cannot anticipate claim 1 under 35 U.S.C. § 102(b).

Claims 2-4 were also rejected under 35 U.S.C. § 102(b) as being anticipated by the Lien patent. Claims 2-4 depend from claim 1, and are believed allowable as depending from an allowable base claim. Additionally, claim 2 has been amended to further differentiate the present invention over Lien. In particular, claim 2 now includes a limitation that the "active pull-up device switches from a first impedance to a second, lower impedance when the voltage signal rises above a designated voltage level between the first and second voltage levels, for decreasing said transition time of the voltage signal." In Lien, there are no devices disclosed that switch between high and low impedances, when a voltage level rises above a designated level, for decreasing the transition time of a low-to-high transitioning voltage signal.

Claims 7, 8, and 11 were also rejected under 35 U.S.C. § 102(b) as being anticipated by the Lien patent. Claim 7 has been amended to further recite that the active pull-up device "decreases a transition time of the communication signal on the one-wire bus transitioning from the second voltage level to the first voltage level," e.g., similar to claim 1. As such, claim 7 is believed allowable for reasons similar to those set forth above in regards to claim 1. Claims 8 and 11, which depend from claim 7, are believed allowable as depending from an allowable base claim. In addition, claim 8 has been amended similarly to claim 2, and is believed allowable for reasons similar to those set forth above in regards to claim 2.

Claims 5, 6, and 12-14 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Lien in view of the admitted prior art of FIG. 1 of the present application ("FIG. 1"). Claims 5, 6, 12, and 13 are believed allowable as depending from allowable base claims. In regards to claim 14, Applicants respectfully traverse this rejection on the grounds that the cited references do not disclose all the elements of claim 14 in combination, and/or that the Examiner has not set forth sufficient motivation for one of ordinary skill in the art to have added the circuit of Lien to the circuit of FIG. 1.

First, claim 14 has been amended to further recite that the active pull-up device "decreases a transition time of the communication signal on the one-wire bus transitioning from the second voltage level to the first voltage level." As discussed above, Lien does not disclose such a device. Second, Applicants agree that one of ordinary skill in the art might dispose a buffer as shown in Lien between a transceiver and subsystem/communication device, at least in a general sense, i.e., buffers are typically disposed between two devices in communication. However, one of ordinary skill in the art would not have been motivated to add the buffer in FIG. 6 of Lien to the circuit in FIG. 1. This is because the buffer of Lien FIG. 6 is a 1-way input buffer, while the 1-wire bus of FIG. 1 is a bi-directional communication line. If the buffer of Lien FIG. 6 was disposed on the 1-wire bus, e.g., in a manner as shown in Exhibit C, the 1-wire bus would no longer function in a bi-directional manner, rendering the bus inoperable for its intended purpose, that is, bi-directional communication between two devices.

To explain further, the buffer in FIG. 6 of Lien has an input 211 and an output 212. A high voltage at the input 211 results in a high voltage at the output 212. However, the output is driven by the input, and not vice versa, i.e., a high voltage applied to the output 212 wouldn't necessarily result in a high voltage at the input 211. In the circuit of FIG. 1, devices at both "ends" of the 1-wire bus communicate by applying voltage signals to the 1-wire bus. If the buffer of FIG. 6 in Lien was disposed on the 1-wire bus, the transceiver would be able to communicate with the communication devices attached to the bus, but the communication devices would not be able to respond. Applicants note that claim 14 recites a 1-wire bus for bi-directional communications.

Because Lien does not show an active pull-up device that decreases the transition time of a voltage signal, and because adding the buffer of FIG. 6 of Lien to the circuit in FIG. 1 of the present application would render the 1-wire bus inoperable for bi-directional communication (meaning, therefore, that one of ordinary skill in the art would not have been motivated to combine the two), it is respectfully submitted that a prima facie case of obviousness has

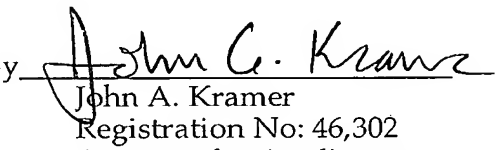
not been established as to claim 14. Accordingly, claim 14 is believed allowable.

CONCLUSION

In view of the foregoing, pending claims 1-8 and 11-14 are in condition for allowance and action to that effect is earnestly solicited.

A check for the Request for Continued Examination fee is enclosed. No other fees are believed due. However, authorization is hereby given to charge any fees owed to our Deposit account No. 13-0235.

Respectfully submitted,

By 
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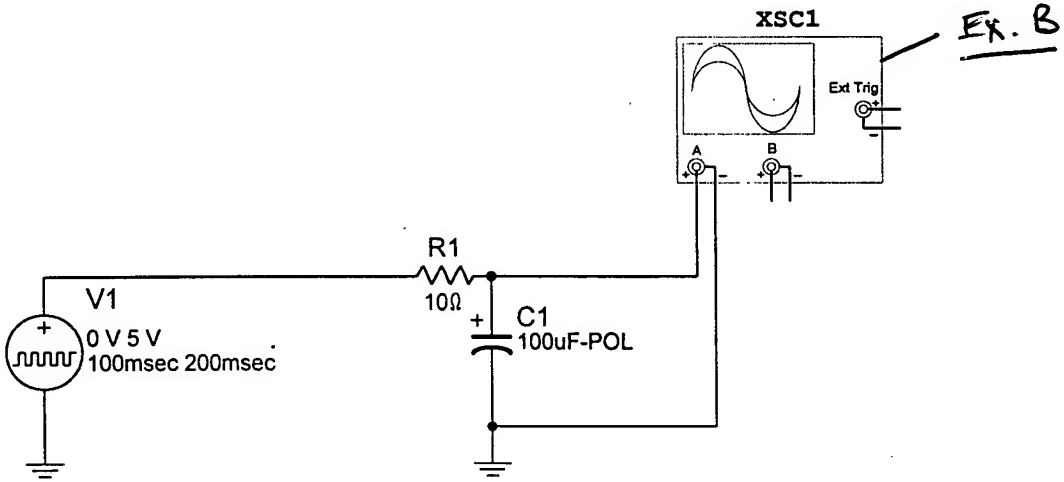
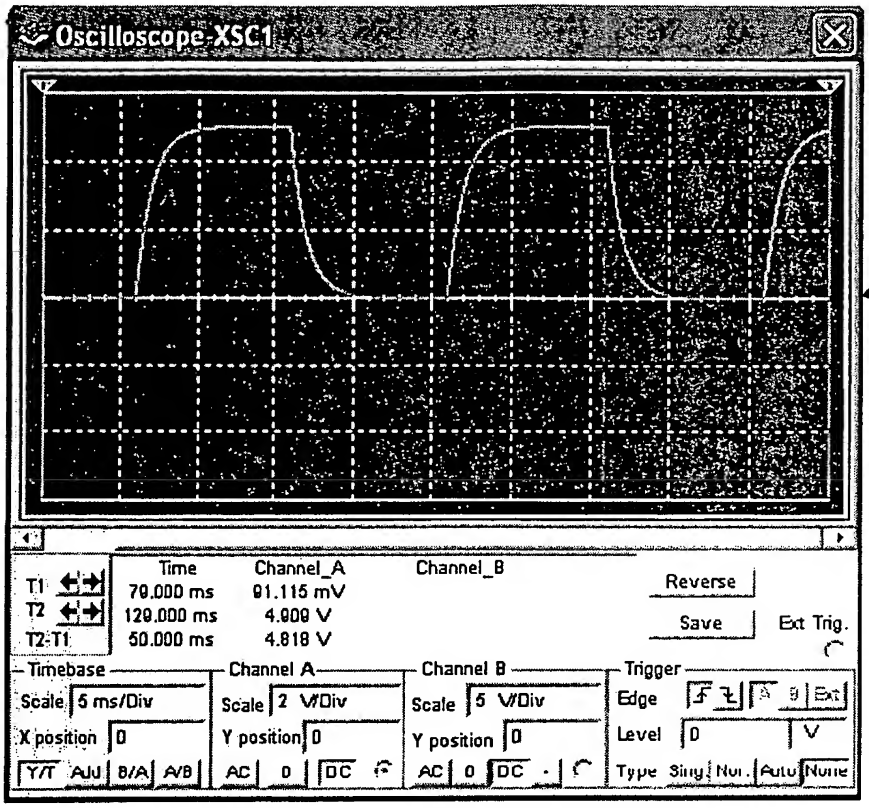


Ex. B

Exhibit A



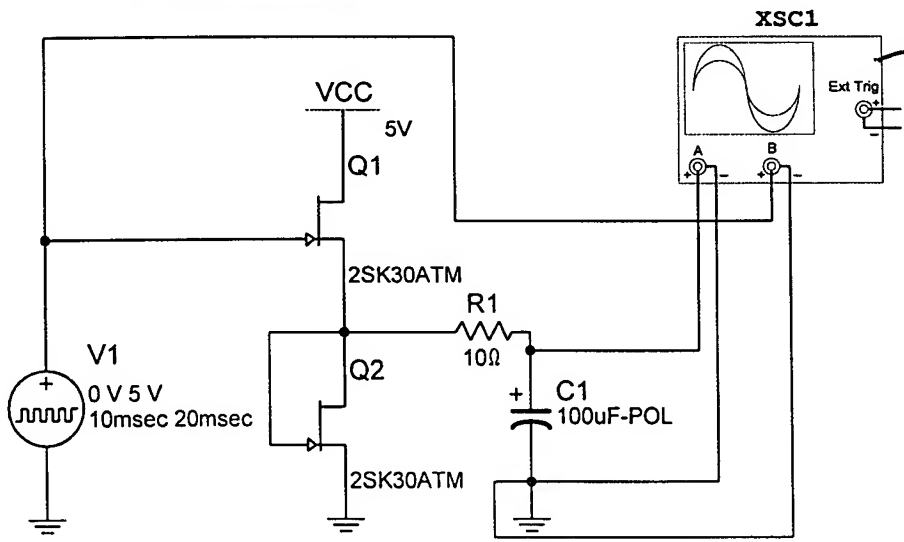
← 5V

← Voltage waveform across C1

← 0V

Rise time ≈ 5 ms

Exhibit B



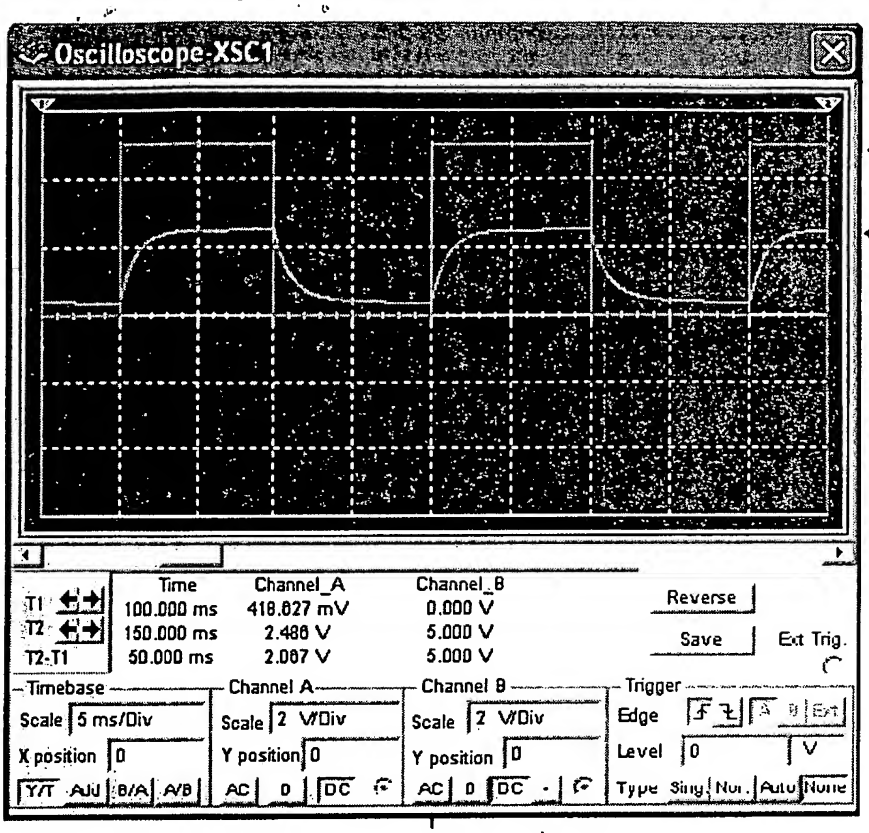
Ex. D

Transitioning low-to-high voltage signal

Lien Fig. 6

1-wire bus

Exhibit C



← input voltage (low-to-high transition)

Voltage signal on 1-wire bus

Rise time > 5 ms

Exhibit D